PMAT Pilot - Analysis Methodology

Introduction

The primary tool used to conduct the PMAT pilots was *Survey Tracker* by Training Technologies, Inc. Supplemental analysis was performed using *Microsoft Excel*.

Survey Tracker is a complete software system that in conjunction with an email program such as *cc:Mail* can be used to design and distribute surveys, as well as tabulate, statistically analyze, and publish the results. The program is comprehensive and makes developing and using surveys for large groups, and/or groups in widely separated locations feasible.

Survey Administration and Data Collection

The survey is sent by the Survey Administrator to each participant using *cc:Mail*. Depending on the survey size, it is either a cc:Mail message, or if above a certain size (which is a limit of *cc:Mail*), it is sent as an attachment. When the participant completes the survey, he or she uses the reply function of *cc:Mail*, sending it back to the Survey Administrator. The results can then be easily batch imported into *Survey Tracker*. For either a large survey, or for a large number of participants, this can result in a significant savings in time, and in greater accuracy.

Analysis Methodology

Survey Tracker contains comprehensive statistical analysis, reporting, and graphing tools. The selection of the appropriate tools to use depends on the nature of the questions, and the goals of the survey. Shown below is the overall strategy of the pilot, as well as examples of the different types of questions used in the G&G Data Acquisition PMAT Pilot, and the types of analyses applied to them.

The overall strategy of this pilot was to look at seven aspects of the G&G Data Acquisition process: Program Effectiveness, Resource Stewardship, Regulatory Compliance, Management Information, Audit Resolution, Organizational Control Environment, and Risk Management. The survey was designed accordingly and the questions were arranged into groups to address these individual factors.

The questions within a particular group were consolidated to produce an overall score and the results were presented in both graphic and tabular form.

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Questions with Likert-type scales:

The Likert-type scale was used for the majority of questions. It measures the respondent's degree of agreement or disagreement with a statement. The major advantage of this type of question is the ability to create aggregate group scores by combining (averaging) all the questions within the particular group. This is the process that was used to create the "spider" plot which showed the overall results for this pilot.

Example Question:

```
[Q4]   The G&G Data Acquisition Program has clearly defined goals
       and objectives to support its mission.

       (1)   Strongly Disagree
       (2)   Disagree
       (3)   Agree
       (4)   Strongly Agree
       (5)   Not Applicable
       (6)   Don't Know.

       Please enter your response here >>
```

Analysis:

These type of questions measure the respondent's agreement or disagreement with a corresponding numeric scale of 1 through 4.

In addition, these questions have 2 stated, and 1 implied modifiers: *Not Applicable*, where the respondent feels the question is not relevant, *Don't Know*, where the respondent doesn't know the answer to the question, and finally *No Response*, which can indicate a number of issues. These modifiers are analyzed separately, and not averaged into the Agree/Disagree portion of the questions. They can provide important insight into the respondent's knowledge of the subject that are not revealed in the numeric scoring of the questions.

Shown below is a typical analysis of a Likert-type question. Typically for these questions, frequency of response, minimum, maximum, and mean were calculated:

| Question/Scale	Score	Freq.
Q4: The G&G Data Acquisition Progra		
< Scale 1: Likert-type		16
No Response		0
1 = Strongly Disagree	1	0
2 = Disagree	2	0
3 = Agree	3	7
4 = Strongly Agree	4	9
5 = Not Applicable	5	0
6 = Don't Know.	0	0

For this question the Minimum (lowest value) is 3 and the Maximum (highest value) is 4. The Mean is calculated by averaging the corresponding numeric values to the Strongly Disagree through Strongly Agree scale (1 through 4). In this case the Mean is (3*7 + 4*9)/ 16 or 3.56. In this example there were no *Not Applicable*, *Don't Know*, and all 16

people surveyed responded.

An example that contains *Not Applicable, Don't Know,* or non-responses is shown below:

```
Question/Scale                        Score      Freq.
Q55: The program has implemented ph
<  Scale 1: Likert-type                            15
      No Response                                   1
      1 = Strongly Disagree            1            0
      2 = Disagree                     2            1
      3 = Agree                        3           10
      4 = Strongly Agree              4            3
      5 = Not App                      5            0
      6 = Don't Know.                  0            1
```

In addition to the Minimum, Maximum, and Mean, this question was not answered by 1 respondent, and 1 didn't know the answer. To analyze this question, the Minimum (2), Maximum (4), and Mean $(2*1 + 3*10 + 4*3)/14$ or 3.14 are calculated as before. In addition, the number of responses to the modifiers are tabulated, in this case it is No Response = 1, and Don't Know = 1. As stated before these can be used to qualify the Agree/Disagree portion of the question. This information was presented by group, rather than individually. Shown below is a graph showing these modifiers for all questions within the Program Effectiveness group.
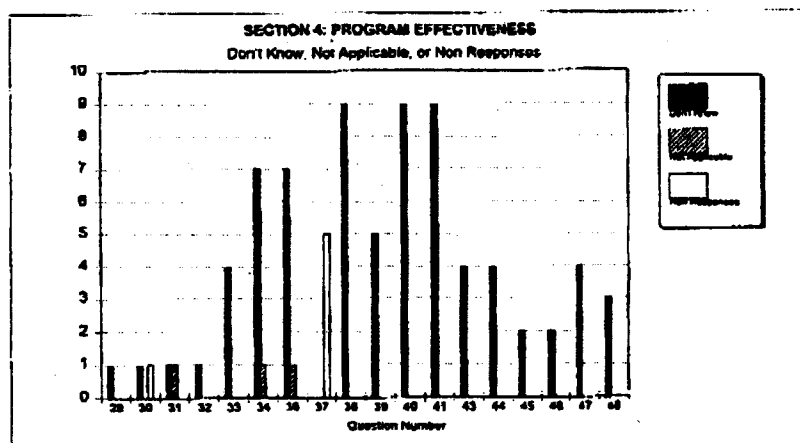
Calculation of the group results that went into the "spider" diagram was done by consolidating (averaging) all of the questions within the group. An example of this is for the Program Effectiveness group is shown below.

This group consisted of questions 29-48. The averages of individual scores are in turn averaged to produce an overall score:
(3.33+3.07+3.07+2.93+3.33+3.13+2.88+3.25+2.71+2.82+3.00+2.57+2.50+2.92+2.93+3.07+2.83+3.23) /18 = 2.98

The combined score (2.98) was used to create the Program Effectiveness leg of the "spider" diagram.

Multiple Choice Questions:

These questions were designed to determine the basis of the respondent's knowledge used to answer the questions of the PMAT pilot. They allow the respondent to select all appropriate choices to describe there response.

Example Question:

```
[Q1]  Knowledge, experience and judgment gained from daily
      operations including:

      Please enter "X" for each applicable response below.
      Enter the "X" between the ">>" and "-" symbols:

      >>     - Information from staff meetings.
      >>     - Information from program coordinators, managers or staff.
      >>     - Communications with customers.
      >>     - Communications with employees throughout the organization.
      >>     - Status reports from internal information systems.
      >>     - Annual accomplishment reports.
      >>     - Program implementation memoranda.
      >>     - Outcomes of challenging management situations.
```
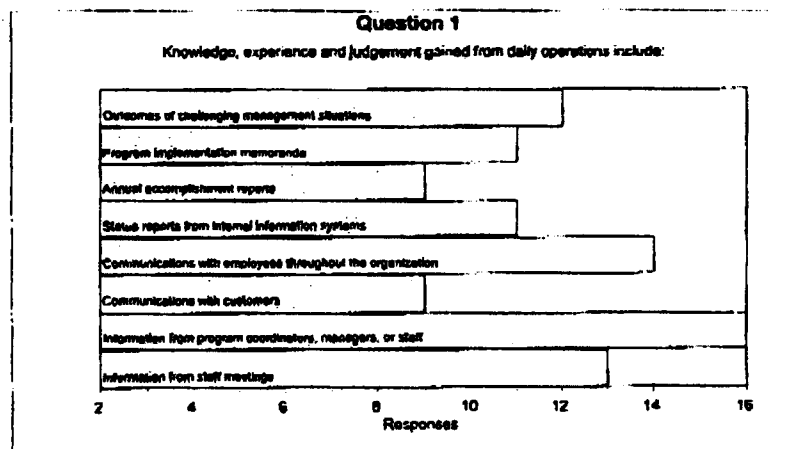
Analysis:

The frequency of response to each item within the question determined how often a particular information source was used by the respondents. This information was presented in both tabular and graphic forms as shown below:

```
Question/Scale                              Score        Freq.
Q1: Knowledge, experience and judgm
    Scale 1: Multiple Choice (Selec                       16
       No Response                                         0
  <    1 = Information from staff m        1              13
  <    2 = Information from program        2              16
  <    3 = Communications with cust       3               9
  <    4 = Communications with empl       4              14
  <    5 = Status reports from inte       5              11
  <    6 = Annual accomplishment re       6               9
  <    7 = Program implementation m       7              11
```

```
                                                   <     8 =
                                                   Outcomes
                                                   of
                                                   challengin
                                                   g        8
                                                            12
```


Question 1
Knowledge, experience and judgement gained from daily operations include:

Open-Ended questions:

Open-ended questions let respondents fill in the blank with their answer. These responses can offer insight into why people responded the way they did to the survey and help to qualify their numeric answers. They also can serve as an indicator where additional issues or problems may exist, or where further analysis may be required.

Example Question:

```
[Q7]  A copy of these policies and procedures are located at:
      (specify location)


      Please enter your response here >>
```

Analysis:

There was no statistical analyses per-se for open ended questions. The responses for each open ended question were compiled and presented in the results.

Yes/No Questions:

These questions require the respondent to make a choice - either "yes" or "no" in reaction to the question. In this survey they were used primarily to ascertain which safeguards are used to protect the various resources within the G&G Data Acquisition program.

Example Question:

```
Safeguards are used to protect the following resources in the program:
-------------------------------------------------------------------
[Q56] G&G data and inventory.

      (Y)  Yes
      (N)  No

      Please enter your response here >>
```
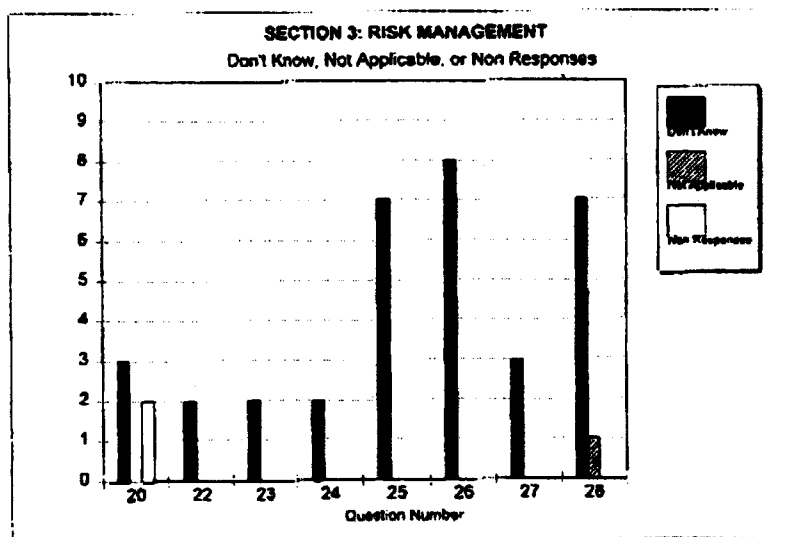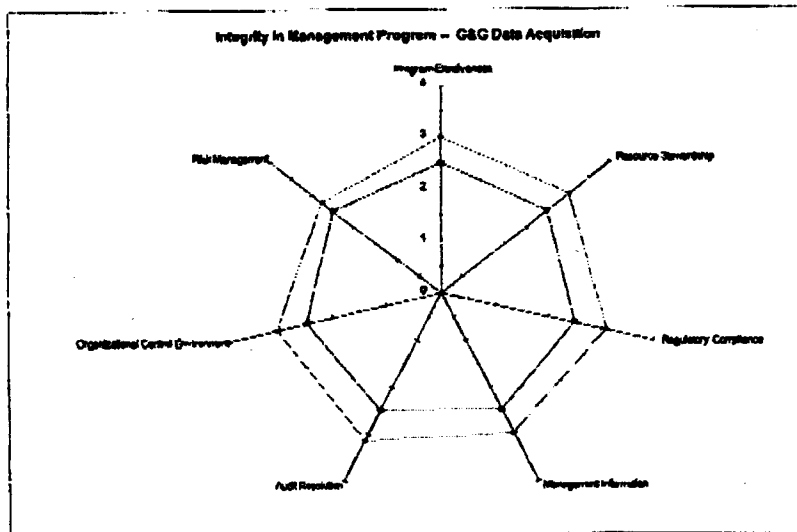
Analysis:

Shown below are the results for the question above. In this case all 16 respondents answered "Yes" to the question. These results can be expressed as a percentage.

```
Question/Scale                          Score        Freq.
Q56: G&G data and inventory.
 <   Scale 1: Binary Choice                           16
         No Response                                  0
         Y = Yes                        1             16
         N = No                         0             0
```

Supplemental Analysis

Although *Survey Tracker* is comprehensive for most aspects of survey design, and analysis, spreadsheet programs such as *Microsoft Excel* are capable of more powerful graphics, and can be more flexible in certain situations. The polar or "Spider" plot is an example of a plot type that is used in the PMAT, but not available directly from Survey Tracker. Microsoft Excel was also used to create summary graphs of a ranges of questions such as those dealing with the modifiers to the Likert-type questions. For these the "Don't Know", "Not Applicable", or non-answers were tabulate by group and presented using *Microsoft Excel* graphics. The data was derived in *Survey Tracker* and imported into *Excel*. Shown below are the Spider plot from the G&G Data Acqusition PMAT Pilot as well as an example of a multiple question bar graph.

Conclusions

The analysis of the G&G Data Acquisition PMAT Pilot was conducted primarily with *Survey Tracker*, with some supplemental analysis using *Microsoft Excel*. These tools proved to be more than capable for the statistical analysis and graphical presentations required by this or any similar type of survey.